Aug. 5, 1969 J. R. MURRAY 3,459,154

APPARATUS FOR PRODUCING MOTTLED BRICK

Filed Jan. 14, 1966

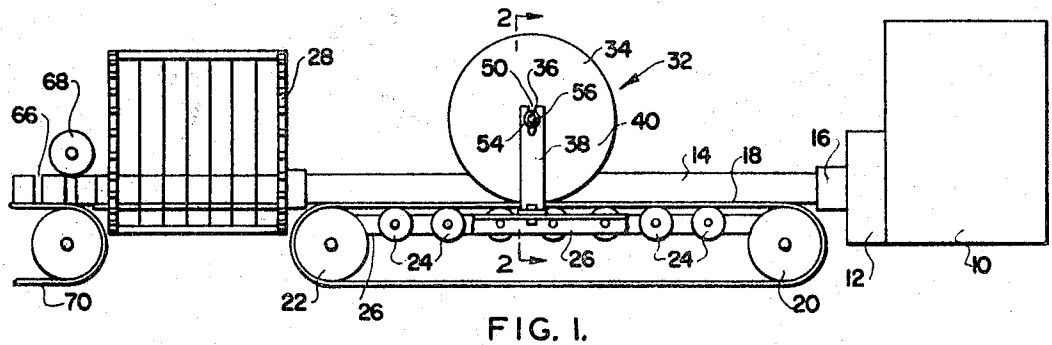


FIG. 1.

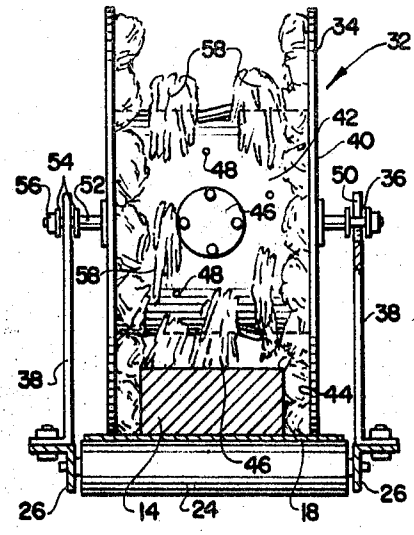


FIG. 2.

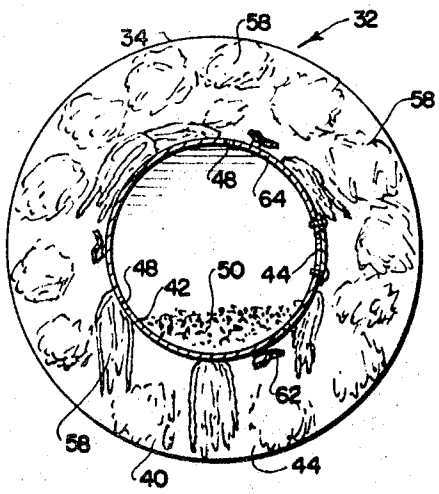


FIG. 3.

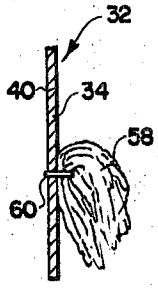


FIG. 4.

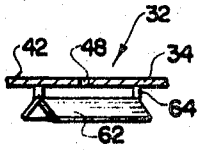


FIG. 5.

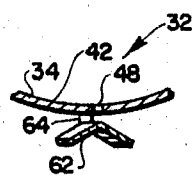


FIG. 6.

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United States Patent Office 3,459,154 Patented Aug. 5, 1969

3,459,154

APPARATUS FOR PRODUCING MOTTLED BRICK

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Filed Jan. 14, 1966, Ser. No. 520,685
Int. Cl. B05c 11/02
U.S. Cl. 118—102 6 Claims

ABSTRACT OF THE DISCLOSURE

An apparatus for applying powdered coloring agents to a wet ribbon of clay includes a conveyor for the ribbon and an applicator for the coloring agents spaced from and disposed transverse to the conveyors. The applicator is spool-shaped and powder-distributing means on the inner surface of the flanges and outer surface of the connecting cylinder. The cylinder is perforated and is adapted to contain the coloring agent. In normal operation, rotation of the applicator releases coloring agents into the distributing means which applies the same to three sides of the moving wet clay ribbon.

This invention relates to the manufacture of brick, and more specifically, to an apparatus for producing a decorative mottled effect on the exposed face and ends of fired clay building products.

In the manufacture of brick, a composition containing clay, coloring agents and other additives is stirred in a power mixer, extended from the mixer in a continuous ribbon having a rectangular cross section, cut into individual blocks and finally fired in a kiln. Some compositions when fired result in a product having different colors or shades of the same color as a result of the ingredients used, the firing conditions, or both. For example, it is possible to produce a brick by this method having a deep red background color interspersed with areas of blue and purple. Unfortunately, these conditions are very difficult to control and the appearance of the resultant product is largely a matter of chance. Considerable variation occurs from batch to batch and it frequently becomes necessary to select bricks for uniformity in background color. The gradations in color in each brick vary so widely that it becomes completely impractical to select bricks having similar color patterns unless, possibly, for a small job like a planter or fireplace. Also, this method does not result in the production of contrasting color pattern, but rather, shadings of the same or similar color.

It is possible to produce a design on the face of a brick in a contrasting color by imprinting the exposed surfaces thereof with a die laid on by a roller or the like prior to firing. The obvious disadvantage of this technique is that all the bricks look exactly alike and large areas of the same design are most displeasing from an aesthetic standpoint. Applying a die to the roller and transferring same to the bricks as a permanent marking also presents some problems.

Ideally, a highly contrasting color should be applied to the bricks prior to firing in an entirely random fashion so that no two bricks would be exactly alike. In addition, the coloring matter or dye should afford sufficient control so that the colors would be uniform and not left to chance as is often the case with other techniques.

It has now been found in accordance with the teaching of the instant invention that the foregoing can, in fact, be achieved by the simple, but unobvious, expedient of feeding the clay ribbon underneath a flanged hollow drum filled with a coloring agent that drops through holes onto soft, loose, mop-like wipers that slap the exposed clay surfaces in a random fashion as they move therebetween.

The coloring agent is preferably in a finely divided dry state and a considerable number of well-known clay additives with special coloring properties have been found satisfactory for this purpose. The gentle wiping action of the loosely-engaging mop-like appendages is, in itself, sufficient to turn the drum thus eliminating the need for separate drive means. The powder falls on the wet clay issuing from the mixer and adheres thereto long enough to enable the ribbon to be cut into individual bricks and fed to the kiln.

It is, therefore, the principal object of the present invention to provide an apparatus for producing mottled brick.

A second object is the provision of a unique color-distributing drum for dusting powdered coloring agents onto continuously-moving ribbons of wet clay.

Another object is the provision of a coloring apparatus whereby contrasting colors can be applied in a random pattern to wet clay surfaces prior to firing.

Still another objective of the invention herein disclosed and claimed is to provide a powder-distributing drum with novel mop-like dusting elements for disbursing the powder.

An additional object is to provide apparatus of the type aforementioned that does not interfere in any way with the conventional brick-making process or require any modification thereof.

Further objects are to provide a brick-mottling apparatus that is inexpensive, completely automatic, easy to use, versatile, free of service problems and compatible with accepted brick-making techniques.

Other objects will be in part apparent and in part pointed out specifically hereinafter in connection with the description of the drawings that follows, and in which:

FIGURE 1 is a side elevation, somewhat schematic, showing the location of the mottling apparatus in relation to the extruder and cutter of a conventional brick-making machine;

FIGURE 2 is a section taken along line 2—2 of FIGURE 1 to an enlarged scale;

FIGURE 3 is a section taken along line 3—3 of FIGURE 2;

FIGURE 4 is a further enlarged fragmentary detail in section showing the manner of attaching one of the mop-like dusting elements to a drum flange;

FIGURE 5 is an enlarged fragmentary section revealing one of the powder-distributing elements fastened to the hub of the drum; and

FIGURE 6 is an end view of the distributing element of FIGURE 5, the hub having been shown in section.

Referring now to the drawings for a detailed description of the present invention and, initially, to FIGURE 1 for this purpose, reference numeral **10** represents the hopper of a conventional clay-mixing machine having an extruder mechanism **12** at the outlet thereof which extrudes a continuous ribbon of wet clay **14** through a rectangular orifice or die **16** onto a moving belt **18**. Belt **18** is reaved around drive and driven rollers **20** and **22** of a standard belt conveyor and the intermediate load-supporting areas of the belt run over idlers **24** journalled for rotation between transversely-spaced parallel frame members **26**. Belt **18** feeds the ribbon of clay **14** to a revolving cutter element **28** which, upon actuation, cuts the ribbon into the individual bricks **30** preparatory to delivering same to the kiln (not shown) for firing.

The foregoing is, of course, standard brick-making equipment and, for this reason, forms no part of the present invention. The mottling apparatus that forms the subject matter hereof has been designated in a general way by reference numeral **32** and will be seen to include a hollow flanged rotating drum **34**, and axle **36** and a pair

of transversely-spaced notched unrights **38** attached to the belt conveyor frame that support the drum for rotation on belt **18** over the moving wet clay ribbon **14**. In the particular form illustrated, the side-plates **40** have their peripheral margins resting atop belt **18** which turns the drum clockwise in FIGURE 1 as the belt moves to the left. Obviously, the drum can be equipped with an independent source of drive power but there is no reason to do so when the frictional contact with the belt answers this need.

Next, with particular reference to FIGURES 2 and 3, it will be seen that the drum **34** has a hollow cylindrical hub **42** of a width substantially greater than the width of the ribbon of wet clay passing therebeneath. An access opening **44** (FIGURE 3) closed by a coverplate **46** provides access to the interior of the hub for the purpose of introducing the powdered coloring agent therein. Spaced around the entire periphery of the hub are a plurality of outlet openings **48** through which the coloring agent **50** passes onto the exterior thereof.

The open ends of the hollow hub **42** are enclosed by the disk-like circular sideplates **40** which, as shown, are of considerably greater diameter than the hub so as to provide continuous annular flanges **44** encircling same in spaced-parallel relation to one another and cooperating with said hub to form a general channel-shaped passage **46** (FIGURE 2) at the bottom through which the wet clay ribbon passes. The flanges **44** have a radial dimension selected to support the hub in spaced relation above the upper surface of the clay ribbon as shown in FIGURE 2 so that the drum lies spaced from both the sides and top surfaces of the latter.

Axle **36** is fastened to the sideplates in coaxial relation to the hub with its ends projecting laterally therebeyond. These projecting axle ends float within notches **50** in the upper ends of supporting uprights **38** so that the flanges can rid on belt **18**. Tubular spacers **52**, washers **54** and nuts **56** cooperate with one another and with the axle and uprights **38** to maintain the drum centered over the moving ribbon of clay.

Now, the single most important feature of the mottling apparatus of the present invention are the mop-like dusting elements **58** that line the annular channel **46** which encircles the drum and which will be described in detail in connection with FIGURES 2, 3 and 4 to which reference will now be made. These dusting elements each comprise several strands of twisted absorbent fibres collected together to form a tuft that is fastened to the exterior surface of the hub and opposed exposed faces of the flanges by suitable fasteners such as wires **60**. The size of these tufts is such as to engage th side and top surfaces of the clay ribbon **14** as the latter passes through the oversize channel **46** defined by the hub and flanges. The drum is partially filled with a powdered coloring agent which sifts out through the openings **48** in the hub as the drum rotates. Once outside the hub, the powder falls onto the tufted dusting elements and a portion thereof is retained by the latter. Then, as these dusting elements pass over the top and sides of the clay ribbon, they discharge some of the powder they hold onto these fresh clay surfaces in a random fashion. The clay is still wet enough at this point to retain much of the powder dusted thereon and, for this reason, it sticks even to the vertical sides. Powder-puff-like dusting elements would function much the same way as the twisted-stand type illustrated except that the latter has a tendency to flop down upon the clay with a "slapping" action that contributes to the random nature of the powder distribution. This is most advantageous for the dusting elements attached to the hub, those on the flanges being more compact and somewhat of the powder-puff type. It has been found, for example, that ordinary mop-head twisted fibres function quite well as the dusting elements.

In FIGURES 3, 5 and 6, the hub of the drum has been shown equipped with shallow V-shaped deflector elements

62 that are mounted on connectors **64** that hold same in spaced relation to the hub surface. These deflectors are placed over one or more of the outlet openings **48** and function to receive the powder issuing therefrom and distribute it onto the adjacent dusting elements. As such, they bring about a more even distribution of the powder although most of the openings **48** are so placed that they transfer the powder passing therethrough directly to one or more of the dusting elements. Much the same effect could be achieved without the deflectors and they are not, therefore, essential to operation of the apparatus.

The top of the clay ribbon issuing from the extruder, of course, becomes the exposed front face of the brick. One end, and sometimes portions of both ends may be exposed, so the sides of the ribbon should be coated to provide for this contingency. On the other hand, the top and bottom faces of the finished brick are rarely exposed because they contain the stress-relief holes and these surfaces, therefore, require no powder to be dusted thereon. For this reason, the powder is preferably applied to the ribbon of clay ahead of the cutting machine that divides it into individual bricks. While much the same effect could be obtained by adding the powder to the individual bricks after they were separated from the ribbon, a good deal of the coloring agent would be wasted by dropping into the spaces **66** left therebetween by separating roller **68** as they leave the cutter on discharge conveyor **70** located adjacent the outlet of the latter.

In closing, perhaps a few words should be said concerning the composition of the coloring agents that are suitable for use in accordance with the teaching of the instant invention. An excellent and comprehensive list of well-known clay additives, many of which are used as coloring agents, can be found in the February 1965 issue of the "Brick and Clay Record" beginning with "chromium oxide" on page 45 and continuing through to "umber" on page 60. Most of these additives are in a finely-divided powdered form suitable for insertion into the drum. Once the desired contrasting color is decided upon, it is generally a simple matter to select the proper additive or combination thereof which, when fired in the appropriate oxidizing or reducing atmosphere and at the correct temperature, will produce the mottled finished product.

What is claimed is:

1. A device for distributing powdered coloring agents onto the top and sides of a wet clay ribbon continuously extended onto a moving conveyor through a rectangular orifice which comprises: a drum having a hollow cylindrical hub of a length greater than the width of the clay ribbon and a plurality of apertures distributed throughout its cylindrical surface, a pair of circular sideplates of a diameter greater than the hub attached to the opposite open ends of the latter in concentric relation to produce circumferential flanges that cooperate therewith in defining a continuous annular groove of a depth greater than the thickness of the clay ribbon, means opening into the interior of the hub for introducing a quantity of a powdered coloring agent, an axle projecting from both sideplates in coaxial relation to the hub, said axle providing means for mounting the drum for rotational movement in position such that the ribbon of clay passes through the annular groove in spaced relation between the flanges and underneath the hub, and powder-distributing means fastened to opposed faces of the flanges and the outer cylindrical surface of the hub in position to receive the powdered coloring agent dropping through the apertures and dust same onto the adjacent surfaces of the clay ribbon.

2. The device as set forth in claim **1** in which: the powder-distributing means comprises a plurality of mop-like cloth fibres formed into tufts.

3. The device as set forth in claim **2** in which: the mop-like tufts attached to the hub include fibres of a

length adapted to slap the top surface of the clay ribbon as the drum rotates thereover.

4. The device as set forth in claim 1 which includes means operatively connected to the drum for rotating same such that the powder-distributing elements move along with the clay ribbon in the same direction and at approximately the same speed while dusting the coloring agent thereon.

5. The device as set forth in claim 4 in which: the means for rotating the drum comprise vertically-slotted supports adapted to receive the axle for rotational movement therein and in position such that at least one of the flanges rides on the moving conveyor carrying the clay ribbon.

6. The device as set forth in claim 1 which includes: at least one generally V-shaped deflector element attached to the hub in spaced relation thereto outwardly of some

of the apertures, said element being adapted to intercept the coloring agent passing through the apertures it covers and disburse same onto the powder-distributing means.

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U.S. Cl. X.R.

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